

What Is Claimed Is:

1. An optical switch formed on a single substrate, the switch having an input and a plurality of outputs, comprising:

a first actuator having a first mirror coupled thereto, the first actuator moving the first mirror between at least one extended position and a retracted position;

a second actuator having a second mirror coupled thereto, the second actuator moving the second mirror between at least one extended position and a retracted position; and

wherein the first mirror and the second mirror are disposed parallel to each other and offset a distance from each other, and by changing the position of at least one of the first and second mirrors, the output of the switch changes.

2. The optical switch of claim 1, wherein when the first mirror is in a first extended position and the second mirror is in a first extended position, an optical beam input to the switch is reflected by the first mirror and output from the switch at a first of the plurality of outputs.

3. The optical switch of claim 2, wherein when the first mirror is in the retracted position and the second mirror is in the first extended position, the optical beam input to the switch is reflected by the second mirror and output from the switch at a second of the plurality of outputs.

4. The optical switch of claim 3, wherein when the first mirror is in the retracted position and the second mirror is in the retracted position, the optical beam input to the switch passes through the switch without being reflected by the first and second mirrors and output from the switch at a third of the plurality of outputs.

5. The optical switch of claim 4, wherein when the first mirror is in a second extended position and the second mirror is in a second extended position, the optical beam input to the switch is reflected by the first and second mirrors and output from the switch at a fourth of the plurality of outputs.

6. The optical switch of claim 1, wherein the first mirror includes a notch capable of letting an optical beam pass through the first mirror without being reflected.

7. The optical switch of claim 6, wherein the second mirror includes a notch capable of letting an optical beam pass through the second mirror without being reflected.

8. The optical switch of claim 1, wherein the first actuator is a double comb drive actuator capable of moving the first mirror into a first extended position, a second extended position, and the retracted position.

9. The optical switch of claim 8, wherein the second actuator is a double comb drive actuator capable of moving the second mirror into a first extended position, a second extended position, and the retracted position.

10. The optical switch of claim 8, wherein the second actuator is a single comb drive actuator capable of moving the second mirror into an extended position and the retracted position.

11. A method of switching an optical switch, comprising the steps of:
providing first and second actuators having first and second mirrors coupled to the first and second actuators, respectively, the first and second mirrors being disposed parallel to each other and offset a distance from each other in an intersection zone, and the first and second mirrors being capable of reflecting and/or passing through an optical beam, depending on positions of the first and second mirrors, to form a plurality of optical outputs;
directing the optical beam to the intersection zone; and
controlling the first and second actuators to position the first and second mirrors to reflect and/or pass the optical beam therethrough to form at least four optical outputs.

12. The method of claim 11, wherein the step of controlling the first and second actuators comprises a step of extending the first mirror in a first extended position and the second mirror in a first extended position, the optical beam input to the intersection zone is reflected by the first mirror and output from the intersection zone at a first of the plurality of outputs.

13. The method of claim 12, wherein the step of controlling the first and second actuators comprises a step of extending the first mirror in a retracted position and the second mirror in the first extended position, the optical beam input to the intersection zone is reflected by the second mirror and output from the intersection zone at a second of the plurality of outputs.

14. The method of claim 13, wherein the step of controlling the first and second actuators comprises a step of extending the first mirror in the retracted position and the second mirror in a retracted position, the optical beam input to the intersection zone passes through the intersection zone without being reflected by the first and second mirrors and output from the intersection zone at a third of the plurality of outputs.

15. The method of claim 14, wherein the step of controlling the first and second actuators comprises a step of extending the first mirror in a second extended position and the second mirror in a second extended position, the optical beam input to the

intersection zone is reflected by the first and second mirrors and output from the intersection zone at a fourth of the plurality of outputs.

16. An optical switch, comprising:

a switching component formed in a substrate;

an input waveguide formed in the substrate, the input waveguide having an input end and an output end, the output end of the input waveguide being disposed at the switching component;

a first output waveguide formed in the substrate, the first output waveguide having an input end and an output end, the input end of the first output waveguide being disposed at the switching component;

a second output waveguide formed in the substrate, the second output waveguide having an input end and an output end, the input end of the second output waveguide being disposed at the switching component;

a third output waveguide formed in the substrate, the third output waveguide having an input end and an output end, the input end of the third output waveguide being disposed at the switching component; and

a fourth output waveguide formed in the substrate, the fourth output waveguide having an input end and an output end, the input end of the fourth output waveguide being disposed at the switching component.

17. The optical switch of claim 16, wherein the switching component is configurable to determine a path through the switching component to be taken by an optical beam which is input to the switching component by the input waveguide.

18. The optical switch of claim 17, wherein the switching component comprises:
a first actuator having a first mirror coupled thereto, the first actuator moving the first mirror between at least one extended position and a retracted position;

a second actuator having a second mirror coupled thereto, the second actuator moving the second mirror between at least one extended position and a retracted position; and

wherein the first mirror and the second mirror are disposed parallel to each other and offset a distance from each other, and by changing the position of at least one of the first and second mirrors, the optical beam input by the input waveguide is output to one of the first, second, third, and fourth output waveguides.

19. An 1 X 4 optical switch, comprising:

a switching component having a pair of mirrors;

an input; and

at least four outputs, the switching component, the input and the outputs being formed in a single substrate, the mirrors being operated such that by changing a position of at least one of the mirrors, the output of the switch changes.

20. The optical switch of claim 19, wherein the mirrors are disposed parallel to each other and offset a distance from each other.

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